

## ECOLOGICAL RESTORATION AND CLIMATE CHANGE MITIGATION STRATEGIES CROSS RIVER STATE, NIGERIA

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### ABSTRACT

Forest cover in Cross River State (7,920km<sup>2</sup>) decreased by 12% from 1991 to 2000 and a further 15% from 2001 to 2008. The State Government then resolved to manage her forest estate for Carbon Concession, removed revenue targets from forest exploitation, placed an indefinite moratorium on logging and set up an Anti-Deforestation Task Force. Climate change caused a land slide disaster at Afi Mountain Wildlife Sanctuary in 2012. Ecological restoration and climate change mitigation programmes were undertaken in 2009. Two million polythene bags were distributed to individuals, communities and forest officers to raise tree seedlings. A total of 2,041,000 seedlings of indigenous tree species were raised between 2009 and 2012 and 10% or 204,000 were planted in 30 communities across the state. The mean survival rate after one year was 74%. The wetter southern part had a higher survival rate of seedlings than the drier northern part of the state. Challenges included bush burning, illegal farming, inadequate funds and lack of vehicles. Opportunities included a strong political will of the state government and the conservation culture of the people. It was recommended that awareness raising and sourcing for new funders be embarked upon.

**KEYWORDS:** Ecological Restoration, Climate Change Mitigation Strategies, Cross River State, Nigeria

### INTRODUCTION

The tropical rainforest in Cross River State has been acknowledged by the International Union for Conservation of Nature (IUCN) as one of the 25 biodiversity hotspots in the world. Extremely rich in fauna and flora many of which are endemic, it has over 1545 species of plants, from 523 genera in 98 families, 6 of these plants are new records in Nigeria and four (4) are new to science and 132 tree species listed by the World Conservation Monitoring Centre as globally threatened. Cross River State is endowed with 119 species of mammals. (Mamza, 2008).

Today, there are 15 Forest Reserves including the newly constituted mangrove forest reserve, one Wildlife Sanctuary and one National Park in Cross River State. The State covers a total land area of 21, 560 km<sup>2</sup> of which 35% (7610 km<sup>2</sup>) is covered by tropical high forest, while 5% is swamp and mangrove forest. Together, these account for about 50% of the remaining rain forest in Nigeria. Of this tropical high forest area, approximately 4000 km<sup>2</sup> was designated as Cross River National Park in 1991. The total forest estate available in Cross River State outside the National Park is 3960 km<sup>2</sup> of which 2150 km<sup>2</sup> (28%) is community forest and 5460 km<sup>2</sup> (72%) is designated as forest reserves (Agbor, 2008).

There has been a rapid rate of deforestation in the state. Forest cover in Cross River State went from 7,920km<sup>2</sup> in 1991 to 6,406 km<sup>2</sup> in 2001(12% decline) and a further 15% decline from 2000 to 2008. Overall annual deforestation rate in Nigeria is 3.5% while it is 2.2% in Cross River State. One of the highest deforestation rates in the world. This prompted the state government to place a ban on logging and set up the anti-deforestation taskforce in 2008 and resolved to management (Oyebo, *et al.*, 2010). In October 2011, Nigeria was granted a REDD+ ready status by the United Nation's REDD policy

board with Cross River State as the pilot state. This heightened the need to protect the remaining forest and enhance the forest carbon stock in line with REDD+ requirements. The wanton destruction of the forest through indiscriminate logging, farming and bush burning in addition to natural disasters like landslides and gully erosion has resulted in the degradation of the ecosystem in many areas of the state thus creating the need for ecological restoration. In line with the state government's vision to reforest degraded forests and protect watersheds and other fragile ecosystems as well as mitigate climate change, aggressive nursery projects were embarked upon in all the 24 forest charges/sub-charges across the state in 2011.

## MATERIALS AND METHODS

### Nursery Development

Two central nurseries for special ecological restoration projects were established; one in Ekinta Forest Reserve in Akamkpa in the South and the other in Cross River North Forest Reserve, Effraya in Etung Local Government Area in the northern part of the state.

### Selection of Communities and Areas for Planting

In 2011, four communities in each Local Government Area of the state were selected through purposeful sampling to provide land for planting. Communities that provided land and labour for tree planting were given incentives in form of cash grant of not less than N100,000.00 each.

The communities that provided land for the planting were selected in consultation with the Local Government Chairmen. The communities then identified areas that needed ecological restoration with the assistance of the forest officers in charge of their area.

In 2012, two million polythene bags were distributed free to private individuals, forest officers and communities for nursery development.

### Enrichment Planting

In the area earmarked for ecological restoration, a baseline was selected. This was usually the longest side of the area. A strip was then cleared in a straight line along the baseline. The strip was pegged at intervals of five metres from the beginning to the end. At each peg, a line was cut at right angles to the base line and pegged at five metre's intervals. Seedlings were planted on the position of pegs. Thus the espacement was 5m. The species were alternated to ensure that no two stands of the same species were planted near each other. The portions between the cut lines were left intact to enhance natural regeneration. The planted seedlings were assessed after one year to determine the survival rate. The entire state was divided into four zones for administrative convenience viz: North east, North West, South East and South West. Each zone was supervised by a board member of the State Forestry Commission.

## RESULTS

The Ecological restoration programme of the Cross River State started in 2009. One hectare of land was planted with indigenous trees in 2009 in Ekinta forest reserve in Akamkpa Local Government Area of the state, while 12.5 ha were planted in 2010 in two locations, 6.25 ha in Ekinta forest reserve and another 6.25ha in Cross River North Forest Reserve in Etung Local Government Area. The Khaya tree seedlings planted in 2009 averaged 3.94m in Height and 18cm in girth.

A total of 1,014,142 seedlings comprising of 25 different indigenous species were raised in 2011 (See table 1). Out of this number, 202,828 (20%) seedlings were planted across the 18 Local Government Areas of the State.

In 2012, one million, four hundred and sixty one thousand, six hundred and eighty five (1,461,685) seedlings comprising of 33 indigenous tree species were raised. Out of this number, 988,085 seedlings were produced in the Forest Charges/sub-charges while the balance of 473,600 was produced by private individuals and communities. Out of this number, 584,674 (40%) was planted.

**Table 1: Summary of Number of Seedlings Produced in Each Forestry Zone**

S/N	Name of Zone	Number of Seedlings
1.	South East	474,500
2.	South West	43,300
3.	North East	114,110
4.	North West	382,232
	<b>Total</b>	<b>1,014,142</b>

In the selected communities, 202,828 seedlings were planted in 402.19 hectares (See Table 2).

The south east had the highest percentage of survival of the planted seedlings followed by the south west then the north west. The north east gave the poorest survival rate of the planted seedlings.

**Table 2: Number of Seedlings Planted in 2011, Area Covered and Survival Rate**

Zone	No. Planted	Area Covered	No. Survived	%
North EAST Zone	77,666	3,106.64 ha	41,163	53
North West Zone	75,111	3,004.44 ha	56,333	75
South West Zone	26,389	1,055.56 ha	23,222	88
South East Zone	23,662	946.48 ha	21,627	91.4
<b>Grand Total</b>	<b>202,828</b>	<b>8,113.12 HA</b>	<b>150092</b>	<b>74</b>

The number of seedlings that survived after one year are shown in table 2. The number of seedlings that survived were 150,092 representing 74%. The southern part of the state had a better survival rate of the seedlings than the northern part (see table 2).

The challenges encountered included bush burning, farming on planted sites, cattle grazing, un-co-operative attitude of some communities inadequate funds and late release of funds.

Afi Mountain, a protected wildlife sanctuary, in which the cross river gorilla (*Gorilla gorilla diehli*), chimpanzees (*Pan troglodyte*), drill monkeys (*Mandrillus leucophaeus*) and other wildlife species are conserved in the state, witnessed climate change impact when 2,371 millimeters of rainfall fell in a single day in August 2012, as opposed to 600 millimeters average rainfall per annum in the area. This caused a monumental land slide disaster. Large boulders in their thousands rolled down the mountain leveling everything on their path. Many trees, farmlands, wildlife and houses were that stood on the path of the rolling boulders were grinded by the rocks and washed away by the accompanying flood. Many rivers changed their courses and new ones emerged. Over 200 sites were affected.

## DISCUSSIONS

The use of indigenous tree species in the ecological restoration programme was innovative in Cross River State. Before this time, no conscious effort was made to restock the forest with indigenous tree species in a plantation or through enrichment planting. Logging was however going on indiscriminately. This resulted in the depletion of not just the tree stock but the biodiversity as well. Choice species like *Triplochiton scleroxylon* (Obeche) and *Mansonia ultisima* were heavily exploited to the point that they were threatened with extinction. Serious effort had to be made to get the mother trees in order to obtain the seeds for propagation. Many forest officers had the erroneous believe that our indigenous tree species do not do well when planted. This assertion was not based on any practical experience in the field. Kennedy

plantations of indigenous tree species in Sapoba established in the thirties (Kennedy, 1935 and Lamb, 1967) did so well that by the seventies, about 35 years after establishment, the trees were fully mature for sawing. They became very attractive to illegal loggers who carried arms and ammunition, generator light and power chainsaws to the plantation and clear felled the trees. They threatened to kill any forest guard that tried to stop them. Preliminary observation of the tree species planted in this programme indicated that *Lovoa trichilioides* and *Khaya Spp* were not only resilient, but also grew fast in most ecological zones of the state. Continuous observation is needed to determine the species best suited in each of the ecological zones of the state since the state has at least five distinct vegetation zones (Wikipedia 2013, Cometonigeria 2011).

The better performance of the planted seedlings in the southern part of the state than the northern part, could be attributed to the fact that there is little or no bush burning in the south. The area experiences a longer rainy season and so the vegetation remains green for a longer period of the year. The dry season is longer in the northern part of the state making the vegetation very dry and easily inflammable. Moreover, the vegetation type in the northern part of the state is derived savanna which has more grasses than what obtains in the south. Grasses provide more fuel for bush fire than trees.

Constant bush burning was implicated in the landslide that occurred at Buanchor in Boki local government located towards the northern part of the State. This was aggravated by climate change as the amount of rain that fell that day had never been witnessed in the area for over 30 years (Jenkins, personal Communication).

The Nigerian REDD+ programme has only Cross River state out of the 36 states of the Federation and Abuja as the pilot state. This was due to the fact that cross River State still had more than 50% of the remaining Tropical forests in Nigeria (Oyibo *et al.*, 2010). According to Sasaki *et al.*, (2010), there is growing recognition of and increasing interest in generating carbon credits through reducing emissions from deforestation and forest degradation with enhancement of carbon sinks (REDD+). Sasaki et al (2010) also advocated enrichment planting with native species for highly degraded forests.

The time of planting also contributed to the differences in the performance of the seedlings planted. The northern part with a shorter rainy season requires that the seedlings be planted early at the beginning of the rains. This would have given them enough time to establish before the rains ceased. This could not be done as the funds for the project could not be released until around July.

Cash incentives (loyalty fees) given to the communities motivated many of them to not only key into the programme, but also took active part in maintaining the seedlings planted. There was an influx of applications from communities who wanted to participate in the programme by providing land and labour after “loyalty” fees were paid to the first set of communities that willingly participated in it.

## CONCLUSIONS AND RECOMMENDATIONS

There is a strong political will to conserve the remaining forest in the state for carbon credit to help mitigate climate change.

Cash incentives were the tonic that motivated many communities to key into the ecological restoration programme.

Enlightenment of all the citizens on the need to protect the planted seedlings should be carried out. Adequate funds should be provided for the programme and on time. Research on the growth rate and adaptability of indigenous tree species to the various eco-zones of the state should be undertaken.

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